

that contain oolitic grains, and are perhaps of marine origin. No economic products of great importance are known, though ores of copper, iron, and manganese have been found, and it is suggested that gold should be sought for.

It only remains to add that the work is well printed and illustrated. If the geological maps are exceptionally ruddy in tint, this arises from the extent of igneous rocks. For the topographical details the author expresses his indebtedness to Mr. H. G. Skill, who contributes also an appendix on meteorology. The photographic views enable the reader to gain a good idea of the scenery and rock-features, as well as of a hyæna-den, of certain stone-circles, and of the Sinai convent.

H. B. W.

ELECTROCHEMISTRY.

A Text-book of Electro-chemistry. By M. Le Blanc; translated by W. R. Whitney and J. W. Brown. Pp. xiv+338. (London: Macmillan and Co., Ltd., 1907.) Price 10s. 6d. net.

THE new English edition of Le Blanc's "Electro-chemistry" has followed very closely upon the publication of the fourth German edition. One is at once struck by the great increase in size of the book and by the large increase in the number of diagrams. From the translators' preface we notice that twenty-five of the diagrams have been added by themselves, and the book has certainly been improved by the additions.

Although the scheme of the book is much the same as it originally was the additions are so numerous that it is almost a new work. By studying this edition and the first edition, which appeared in 1895, one is struck by the large amount of work which has been done in the domain of electrochemistry, albeit the fundamental laws have undergone very little change, the chief being one of degree rather than of principle. The ionic theory has been assailed from all sides, but although certain modifications have been made, such, for example, as the conception of the hydration of the ions, it must be conceded that it has rather gained strength than lost by the attacks. If those who assail the theory would give an alternative hypothesis which would as satisfactorily explain the phenomena of solution as does the ionic hypothesis, then the arguments would assume a more tangible form, and the ionic theory might be consigned to the limbo of history.

Prof. Le Blanc deals almost entirely with the theoretical aspects of electrochemistry, but at certain points he indicates the bearing of theory on practice. For example, on p. 18, when referring to the conversion of heat into electrical energy and of electrical energy into heat, a digression upon the "Electrical Furnace and its Industrial Importance" is made, the application of Ohm's law being given. Brief reference is here made to calcium carbide, cyanamide, carborundum, phosphorus, and the preparation of nitrates from atmospheric nitrogen, but the book, as already mentioned, does not deal with technical processes.

Chapter ii. deals with the development of electro-

chemistry up to the present time, and treats in the main with the development of the ionic theory.

More notice might have been taken of the difficult subject of the electrolysis of fused salts, the author having contented himself with a footnote on p. 316 referring the reader to Lorenz's "Die Elektrolyse geschmolzener Salze," and a remark that the phenomena are entirely analogous to those of aqueous solutions. The interesting phenomenon of electrolysis without electrodes is referred to on p. 317, and it is pointed out that in this case, as in electrolysis where both electrodes dip into the solution, Faraday's law is obeyed.

The translators, Drs. Whitney and Brown, have paid particular attention to nomenclature, and have endeavoured to be consistent throughout. The method adopted is set out in full in an appendix. The adoption of F instead of E for electromotive force is hardly happy; according to this rendering we get Ohm's law

$$C = \frac{F}{R}.$$

F is more generally used to denote a Faraday, or 96,540 coulombs of electricity. The translators employ the symbol Q for quantity of electricity. These are, of course, minor points, but they are inclined to muddle the student. It would perhaps be a good thing to convene an international committee so that electrical and electrochemical nomenclature might be standardised; at present it must be admitted that it is more or less chaotic.

From a theoretical standpoint we do not think it possible to meet with a better book than the one before us, and there is little doubt that it will be highly appreciated and widely studied. F. M. P.

AUSTRALIAN INSECTS.

Australian Insects. By Walter W. Froggatt, Government Entomologist, New South Wales. Pp. xiv+449; with 37 plates, containing 270 figures, also 180 text-blocks. (Sydney: William Brooks and Co., Ltd., 1907.) Price 12s. 6d.

THIS is the first general introductory work published of the insects of Australia, and it will be very useful to residents commencing the study of entomology, as well as to any European or American entomologists who wish for a general view of the Australian insect fauna, which contains a large number of highly interesting forms not met with in other parts of the world, though some species found in the extreme north appear to be only an offshoot from the rich tropical fauna of New Guinea.

The classification adopted is mainly that employed by Dr. D. Sharp in the "Cambridge Natural History." Mr. Froggatt commences his work with an introduction, tables of contents, and chapters on classification, distribution, structure, and fossil insects; after a detailed account of the principal groups of insects represented in Australia, including much interesting information about habits, &c., he concludes the book with chapters on the collection and preservation of insects, museum collections and types, publications dealing with Australian entomology, and an alphabetical index of Latin and English names.

We have, fortunately, no representative of the termites, or white ants, in Britain, though one species is found as far north as Bordeaux; but the author figures the huge nests of several Australian species, one of which, *Termes meridionalis*, Froggatt, builds what is called a "magnetic nest," like a brick wall, about 10 feet high and long (judging from the figure of the man standing in front), always pointing north and south, with the wall facing east and west. Another species, *Eutermes pyriformis*, builds a towering pillar-shaped nest, often 18 feet high.

Among the more remarkable specially Australian insects of various orders figured in this book, we may mention the curious apterous desert cockroaches (genus *Polyzosteria*, p. 19); the great Phasmidæ (of which *Podacanthus wilkinsoni*, Macleay, is figured as an example on plate v.); various strange grasshoppers, &c. (on plates vi. and vii.), and neuropterous insects (pp. 60, 61, plate ix.); the curious sawflies belonging to the genus *Perga*, &c. (pp. 71-73, plates x. and xi.); various handsome Buprestidæ (plate xviii.); the gaudy day-flying moths of the family Agaristidæ (p. 233) and the "whistling (stridulating) moths" of the genus *Hecatesia*, which emit sounds like the call of a Cicada (pp. 234, 235), of which latter group there are also many large and remarkable Australian species. We may also note that while the butterflies of Australia are not specially numerous or remarkable, the moths are extremely numerous and interesting, many being very remarkable either for their size, their structure, or their beauty. Of course, we do not meet with many British species, but among them we may mention forms of the painted lady butterfly and the convolvulus hawkmoth, hardly distinct from the ordinary European insects, and the well-known meal moth or flour moth (*Asopia farinalis*, L.) figured on p. 269.

Occasionally we note a trifling error; thus, on p. 41, the names *Locusta danica* and *Cedaleus senegalensis* appear to have been transposed by some accident.

We congratulate Mr. Froggatt on the publication of this useful and interesting book. W. F. K.

OUR BOOK SHELF.

Nature's Craftsmen: Popular Studies of Ants and other Insects. By Henry Christopher McCook. Illustrated from Nature. Pp. xi+317. (London and New York: Harper and Brothers, 1907.) Price 7s. 6d. net.

Dr. McCook has long been known as one of the most painstaking and successful of the investigators of insect life in America, and the publication of a selection of his researches in a more popular form will, we hope, bring them under the notice of a far wider public than his former works have appealed to. There is no want of variety in the volume before us, and, in addition to ants and spiders, which are perhaps the author's favourites, he discusses bees, wasps, ant-lions, cicadas, caddises, &c. Still, nearly one-third of the book is taken up with the most interesting subject of the whole insect world, ants; probably the most highly organised of all known animals, born, not only in complete armour, like some of the ancient gods and

heroes, but provided with all the tools and requisites necessary for their busy and industrious lives, even to brushes and combs, &c. Their wonderfully organised communities, where each works for all, and all for each, make our most advanced civilisations appear almost as barbarism in comparison, and our grandest architectural and engineering triumphs little better than mud-pies.

Among the most curious developments of ant-life are the so-called "honey-ants," where the nests contain a certain class of ants in which the abdomen becomes enormously distended with a sweet substance derived from a kind of oak-gall. When they have attained this condition, they pass their lives in the nests, hanging to the uneven roofs of the vaulted chambers, and they dispense food to the workers, by whom they are tended like the other dependent classes of the community, such as the queens and larvæ. An excellent illustration of one of these internal chambers is given on p. 99. This was taken from a nest eight feet long, three feet high, and a foot and a half wide, formed of galleries and chambers honeycombed in the solid rock.

The book is written in a very pleasing style throughout, with the exception of the last few pages, which bear signs of haste. The illustrations are also numerous and spirited and many readers will be pleased to see the frontispiece, which gives us a portrait of the amiable author sitting on a lawn in a garden chair.

In conclusion, we may perhaps venture to express a regret that the word "instinct" is still used, as it appears to us to be an obsolete expression which is philosophically untenable at the present day, and which it would be just as well to avoid.

Concrete Steel Buildings. By W. Noble Twelvetrees. Pp. xii+408. (London: Whittaker and Co., 1907.) Price 10s. net.

This is a companion volume to the author's work on concrete steel, in which the distinctive characteristics of reinforced concrete were dealt with, and the theory underlying the design of structures in this material was discussed fully and in detail. In the present volume the author gives particulars of a number of typical pieces of constructional work in ferro-concrete which have been carried out in this country and abroad during the past few years. Mr. Twelvetrees has selected with great care the various examples of this method of building construction which he describes, and architects and engineers who consult this book will have little trouble in finding full descriptions of buildings similar to any they may be called upon to design. Examples of transit sheds for docks, railway goods stations, warehouses, factory buildings, business premises, villas, flour mills, hotels, theatres, &c., are all in turn fully described, and excellent illustrations are given of all important details, with copious notes as to the methods of making the concrete, the nature and disposition of the reinforcing steel, and of the results of proof tests of the structures. In the illustrations, which form a very important feature of a book of this nature, the author has wisely contented himself with giving the chief overall dimensions. When a radical departure from ordinary practice, such as the use of ferro-concrete, is made in constructional works, much can be learnt from the inevitable failures, and the last chapter of the book is devoted to a brief account of a few noteworthy collapses and of the probable causes of these failures, whether due to faulty design, or to bad workmanship, or to both causes. In the appendix a list is given of concrete-steel buildings and other structures in the United Kingdom, which will be found useful by those who are anxious to have the chance of inspecting such works before